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APPLICATION FOR LETTERS PATENT

**Interactive Entertainment System For Presenting  
Supplemental Interactive Content Together With  
Continuous Video Programs**

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1 **TECHNICAL FIELD**

2 This invention relates to interactive entertainment systems, such as  
3 interactive television or interactive computing network systems. More  
4 particularly, this invention relates to methods for presenting supplemental  
5 interactive content in conjunction with continuous video programs to enable  
6 viewer interactivity with the otherwise non-interactive video programs.  
7

8 **BACKGROUND OF THE INVENTION**

9 Video content programs, such as TV shows and pay-per-view movies, are  
10 delivered to a viewer as a continuous data stream. Today, programs are most  
11 commonly distributed using a wireless broadcast system, or a cable system. In the  
12 first instance, the programs are broadcast over a wireless network and received at  
13 individual homes through an antenna or satellite dish. In the latter case, the  
14 programs are transmitted over cable to set-top boxes resident in the viewers'  
15 homes.

16 In broadcast distribution systems, there is no opportunity for interactive  
17 control of the content by the viewer. The viewer simply has an option to watch the  
18 program, change to a different program, or turn off the television. However, as  
19 consumers have learned from playing video games on their televisions, non-  
20 interactive viewing is not nearly as fun or sensory rich as interactive entertainment.

21 To enhance the traditional way of viewing television, there has been some  
22 effort toward the production of interactive programming content. As presently  
23 contemplated, additional interactive content is created to enhance the existing  
24 traditional program. This supplemental content is played along with the  
25 continuous video stream to enable viewers to interact with the program in a more

1 involved manner than simply watching it. The supplemental content might, for  
2 example, ask the viewer questions about the episode, or play games with the  
3 viewer that relate to the show, or describe behind-the-scenes aspects of making the  
4 program. However, there remains a significant hurdle concerning how to create  
5 and distribute interactive programs.

6 Apart from the TV environment, however, computer users are familiar with  
7 interactive content on their computers. Many users own interactive multimedia  
8 CD-ROM applications that combine video, audio, pictures, text, and other content  
9 into a rich and responsive presentation. Familiar examples of interactive computer  
10 applications include games (e.g., Myst from Broderbund), educational programs  
11 (e.g., Reader Rabbit series from the Learning Company or Magic Schoolbus series  
12 from Microsoft), and home entertainment (e.g., Encarta from Microsoft).

13 Interactive content is also available from online services over a public  
14 network. Most notably, the Internet is emerging as a means for supplying video,  
15 sound, pictures, text, and other multimedia rich resources to a user's computer.  
16 Through the Internet, users can access a wide variety of resources that are  
17 maintained on computers located around the world.

18 Resources available on the Internet are most commonly presented as  
19 hypertext. "Hypertext," also referred to as "hypermedia," is a metaphor for  
20 presenting information in which text, images, sounds, and actions become linked  
21 together in a complex, non-sequential web of associations that permit a user to  
22 browse through related topics, regardless of the presented order of the topics.  
23 Hypermedia content is widely used for navigation and information dissemination  
24 on the "World-Wide Web" (WWW or Web) of the Internet. An application  
25

1 program referred to as a "Web browser" is normally used to retrieve and render  
2 hypermedia content from the WWW.

3 Despite the development of interactive entertainment in the computer  
4 sector, there has been little activity spilling over into the traditional television  
5 world. The TV environment poses a problem in that the programs are typically  
6 delivered as a broadcast of a continuous data stream, which inherently does not  
7 support interactive control. Interlacing interactive content presents a difficult  
8 design issue.

9 One proposed solution is a technology referred to as "Intercast technology"  
10 which is available from the Intercast Industry Group, a consortium of leading  
11 television networks, program hardware vendors, and software vendors. The  
12 Intercast technology presents both television programs and Internet data together  
13 on the same television or computer monitor, but with separate and predefined  
14 panes.

15 Fig. 1 shows a screen 14 (television or computer monitor) which illustrates  
16 the Intercast technology. The screen 14 is divided into panes, as represented by  
17 panes 16-18. Pane 16 contains the television program resulting from the video  
18 data. Pane 17 contains a hypermedia document, such as a Web page, that is  
19 provided by the Internet data. A third pane 18 can be used to show additional data,  
20 such as advertisements or the like.

21 The Internet data is combined with the video data of the television program  
22 to form a single signal that is broadcast to the viewer. The Internet data is  
23 transmitted during the vertical blank interval (VBI) between successive frames of  
24 the video data. The Internet data and video data are separated at the viewer's  
25 computer and presented simultaneously within their respective panes.

1 The drawback with the Intercast technology is that it rigidly adheres to the  
2 paned presentation. The television pane 16 is a self-contained pane which is  
3 dedicated to showing only the video program, and the Web pane 17 is a separately  
4 self-contained pane which is reserved exclusively for Web content. Content  
5 providers who develop the Internet data have no control over how the television  
6 program and interactive supplemental content is presented to the viewer. They can  
7 simply control how the data is presented within its own box 17. Accordingly, the  
8 content providers are significantly limited in what they can create in the way of a  
9 full interactive media event.

10 The inventors have developed a better way of creating and distributing  
11 interactive programming that frees the content providers of these restrictions.  
12

### 13 SUMMARY OF THE INVENTION

14 This invention concerns an interactive entertainment system for supplying  
15 interactive supplemental content along with continuous video content programs to  
16 viewers. The programs are supplied from a program provider, such as a cable  
17 headend or a broadcast station, over a distribution network to a viewer computing  
18 unit. The programs are continuous, non-interactive data streams, such as television  
19 shows, movies, or other video content.

20 The viewer computing unit is implemented as a television, a television/set-  
21 top box unit, a personal computer, or the like. It has a processor and memory. An  
22 electronic programming guide (EPG) is stored in the memory and executable on  
23 the processor to organize programming information that is descriptive of the video  
24 content programs. The EPG maintains a data field that indicates whether the video  
25 content program is interactive. The EPG data field contains a pointer, universal

1 resource locator, or other target specification to the target resource that supports  
2 the interactive content and correlates this data field with the particular program  
3 that the supplemental content is designed to enhance. Accordingly, if a target  
4 resource is listed in conjunction with a particular program, the program is  
5 recognized as being interactive. The supplemental content can be developed and  
6 provided by the same provider that distributes the video content program, or by an  
7 independent service provider.

8 When the viewer tunes to a particular channel, the viewer computing unit  
9 consults the EPG to determine if the present program is interactive. If it is, the  
10 viewer computing unit launches an interactive support module, such as an Internet  
11 browser. This browser is kept in memory and is dynamically loadable for  
12 execution on the processor when the viewer tunes to a channel carrying a video  
13 content program that the EPG identifies as interactive. The viewer computing unit  
14 also depicts a small icon or other indicia to alert the viewer that the program is  
15 interactive. The viewer can click on or otherwise activate the icon to enter the  
16 interactive mode and display the supplemental content. As an alternative, the  
17 supplemental content can be automatically displayed in response to launching the  
18 Internet browser.

19 The Internet browser uses the target specification in the EPG to start the  
20 target resource. The target resource contains the supplemental content to enhance  
21 the television program. The supplemental content might be, for example,  
22 questions about the program, games, trivia information, facts about the actors and  
23 producers, information on other episodes, advertisements, a listing of products or  
24 memorabilia about the program, and so on. The supplemental content and  
25

1 program can be transmitted together as a single signal, which is separated at the  
2 viewer computing unit, or separately over two channels or two different networks.

3 The target resource also contains display layout instructions prescribing  
4 how the supplemental content and the video content program are to appear in  
5 relation to one another when displayed on the television or monitor. When the  
6 data from the target resource is downloaded to the viewer computing unit, the  
7 processor is responsive to the layout instructions obtained from the target resource  
8 to display the supplemental content concurrently with the video content program.

9 Embedding the layout instructions in the supplemental content  
10 advantageously returns control of the presentation to the content developers. The  
11 developers can now arrange the data and video in any manner they choose. The  
12 developers are not restricted to specific fixed panes, as in the prior art.

### 13 14 **BRIEF DESCRIPTION OF THE DRAWINGS**

15 Fig. 1 is an illustration of a screen showing a paned presentation format for  
16 presenting television programs and Internet data according to prior art Intericast  
17 technology.

18 Fig. 2 is a diagrammatic illustration of an interactive entertainment system  
19 according to one implementation. The Fig. 2 implementation is representative of  
20 an interactive TV system.

21 Fig. 3 is a simplified example of data fields in a data structure maintained  
22 by an electronic programming guide.

23 Fig. 4 is a diagrammatic illustration of an interactive entertainment system  
24 according to a second implementation, which is representative of an interactive  
25 integrated PC-TV system.

1 Fig. 5 is a block diagram of a viewer computing unit according to an aspect  
2 of this invention.

3 Figs. 6 and 7 show a flow chart for operating an interactive entertainment  
4 system.

5 Fig. 8a-8c are a series of exemplary screen illustrations showing different  
6 display layouts of the video program and the supplemental content.

7 Fig. 9 is a flow chart of a method for authoring an interactive entertainment  
8 program.

## 9 10 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

11 Fig. 2 shows an interactive entertainment system 20 implemented as an  
12 interactive television (ITV) system. System 20 includes a centralized headend 22  
13 which is configured to provide continuous video content programs to multiple  
14 subscribers. These programs might include traditional broadcast TV shows,  
15 movies, games, and the like. The programs are transmitted as a continuous data  
16 stream, which is non-interactive in itself.

17 Each subscriber has a viewer computing unit 24. In the illustrated  
18 implementation, the viewer computing unit is embodied as a set-top box (STB) 26  
19 coupled to a television (TV) 28. The STB 26 receives digital video signals from  
20 headend 22 and controls which programs are displayed on the TV 28. The STB 26  
21 is controlled by the viewer through use of a panel control located on its face, or a  
22 hand held remote control unit 30. Instead of a separate STB, however, a viewer  
23 computing unit can be incorporated in the TV itself. In addition to televisions, the  
24 viewer computing unit might be implemented with other types of visual display  
25



1 units, such as a computer monitor, as is described below with respect to the Fig. 4  
2 implementation.

3 Each viewer computing unit 24 is configured to run an electronic program  
4 guide (EPG). The EPG provides an on-screen listing of various programs or  
5 program titles. The listing is organized in a predetermined arrangement that is  
6 displayed on the television. The EPG might also include other program  
7 descriptive information, including whether the program is provided in closed  
8 caption or stereo.

9 Headend 22 is interconnected to the subscribers via a distribution structure  
10 or network 32. The distribution structure 32 can be implemented in different  
11 ways. One implementation is a multi-tier network which includes a high-speed,  
12 high-bandwidth fiber optic cable network between the headend and regional  
13 distribution nodes (not shown), and conventional home entry lines, such as  
14 twisted-pair lines or coaxial cable, between the distribution nodes and viewer  
15 computing units. Other implementations include satellite communications (e.g.,  
16 DSS technologies), RF communication, or other wireless technologies. Moreover,  
17 the network can be constructed using a combination of wireless and wire-based  
18 technologies.

19 In the illustrated implementation, the network 32 provides both the pipeline  
20 for distribution of programs from the headend to the subscriber, as well as a back  
21 channel which enables communication from the subscriber to the headend. The  
22 back channel permits the viewer to send requests and instructions to the headend to  
23 facilitate interactive control.

24 Headend 22 provides video content programs to the viewer computing unit  
25 24. The programs are embodied as video data streams that are transmitted from

1 headend 22 over distribution structure 32 to the viewer computing unit. The  
2 headend maintains a database of programs 40 that can be served by a continuous  
3 media server 42 to individual viewers in an on-demand mode. The headend can  
4 also retransmit to its subscribers broadcast video signals that it receives from  
5 another source, such as a satellite feed or another cable system. The video data  
6 streams are sent to the viewer computing units in digital or analog format.

7 An EPG server 44 is provided at headend 22 to serve the programming  
8 information needed by the EPG at the viewer computing unit 24. The EPG server  
9 44 is implemented as a structured query language (SQL) database 46 with records  
10 containing information relating to available shows or programs.

11 The headend 22 further includes an enhanced content server 52 which  
12 serves supplemental interactive content to the viewer computing units to enhance  
13 or supplement the continuous video streams served by the continuous media server  
14 42. The supplemental content is stored digitally in database 54 and can be text,  
15 graphics, video, picture, sound, or other multimedia types. Examples of  
16 supplemental content include trivia questions or games related to the program,  
17 advertisements, merchandise or other memorabilia, hyperlinks to similar programs  
18 of similar type or starring the same actor/actress, and so on.

19 In the implementation described herein, the supplemental content is  
20 constructed as a hypertext file which is rendered by a browser. Hypertext, or  
21 hypermedia, is a metaphor for presenting information in which text, images,  
22 sounds, and actions become linked together in a complex, non-sequential web of  
23 associations that permit a user to browse through related topics, regardless of the  
24 presented order of the topics. Hypermedia content is widely used for navigation  
25

1 and information dissemination on the "World-Wide Web" (WWW or Web) of the  
2 Internet.

3 Hypermedia content is commonly organized as documents with embedded  
4 control information. The embedded control information includes formatting  
5 specifications, indicating how a document is to be rendered by the browser. In  
6 addition, such control information can include links or "hyperlinks," which are  
7 symbols or instructions telling the browser where to find other related documents  
8 on the Internet. A hyperlink includes a label, which is typically rendered as a  
9 graphical icon or as highlighted keywords, and an underlying target specification.  
10 The target specification is set forth in the underlying hypermedia document, but is  
11 normally invisible to the user. The target specification unambiguously identifies a  
12 targeted document or resource, specifying the name of the computer on which the  
13 document resides and the complete file name of the document.

14 In concept, the target resource can be virtually any type of object—  
15 including executable programs, text or multimedia documents, sound clips, audio  
16 segments, still images, computers, directories, and other hyperlinks. In WWW  
17 documents, hyperlink targets are most often files that can reside on any computers  
18 connected to the Internet. However, a hyperlink target can also be a particular  
19 location within a document, including the document that is currently being  
20 rendered. Hypertext usage is not limited to the Internet. Various multimedia  
21 applications utilize hypertext to allow users to navigate through different pieces of  
22 information content.

23 Fig. 3 shows an example data structure 48 which is used by the EPG  
24 database 46 to organize programming information and to correlate target  
25 specifications with the programs. The data structure includes a number of data

1 records comprising various data fields 50 for holding programming information.  
2 The data fields contain program titles, actor names, whether the program has  
3 closed captioning or stereo audio, the scheduled time of the program, the network  
4 name, and description text. Each program record in the data structure 48 also  
5 holds pointers to storage locations within the continuous media server 42 which  
6 hold the video data streams of the programs corresponding to the program records.

7 The data structure 48 includes a data field 58 for holding target  
8 specifications which reference target resources supporting the supplemental  
9 content. The data structure correlates the target specifications with the programs  
10 by associating them within the same program record. The presence of a target  
11 specification within the data field 58 indicates that the associated program is  
12 interactive and that complementary content can be displayed in addition to the  
13 program itself. The target specification can be implemented in different forms.  
14 The target specification to the supplemental content stored at the headend which  
15 enhances the "Murder, She Wrote" program is in the form of a pointer  
16 "CONTENT1." The presence of this pointer in field 58 indicates that the program  
17 "Murder, She Wrote" is interactive compatible and that the supplemental content  
18 resides at a memory location identified by the pointer "CONTENT1." Similarly,  
19 the programs "Seinfeld" and "Star Trek" are interactive compatible and have  
20 associated supplemental content which are located by the hyperlink URLs in  
21 corresponding data field 58. These URLs reference resources provided by  
22 independent service providers (described below with reference to Fig. 4).

23 A URL (universal resource locator) is a type of target specification used in  
24 WWW documents to describe everything about a particular resource that a  
25 browser needs to know to request and render it. The URL describes the protocol a

1 browser should use to retrieve the resource, the name of the computer it is on, and  
2 the path and file name of the resource.

3 The following is an example of a URL listed in the EPG data structure 48 in  
4 association with the "Seinfeld" program:

5  
6 `http://www.nbc.com/seinfeld`  
7

8 The "http://" portion of the URL describes the protocol. The letters "http"  
9 stand for HyperText Transfer Protocol, the set of rules that a browser will follow  
10 to request a document and the remote server will follow to supply the document.  
11 The "www.nbc.com" portion of the URL is the name of the remote host computer  
12 which maintains the document. The last portion "/seinfeld" is the path and file  
13 name of the document on the remote host computer.

14 The development of the EPG data structure 48 includes designating separate  
15 data fields 50 within a storage medium for holding programming information, and  
16 dedicating at least one of the data fields 58 to storing target specifications to  
17 supplemental content. The target specifications can be in the form of memory  
18 pointers, hyperlinks, URLs, or any other designation for referencing a location  
19 containing supplemental content. For programs with no corresponding  
20 supplemental content, the target specifications data field 58 is left empty.  
21 However, for those programs with supplemental content, the target specification to  
22 the target resource containing the supplemental content is entered in the data field  
23 58 and correlated with the program. The correlation is provided through the data  
24 structure by the placing the target specification within the same data record as the  
25 program title and other information for a particular program. It is further noted

1 that the target resources can be embedded within other text-based data held in  
2 other data fields 50 which also relate to the corresponding programs.

3 The same or a subset of data structure 48 is employed at the EPG  
4 application running at the viewer computing unit in the home. The data records  
5 stored at the headend on the EPG server are transmitted periodically in batch, or  
6 individually, and cached at the local EPG. The local EPG is thus able to identify  
7 whether a particular program is interactive compatible by quick reference to the  
8 locally cached EPG data structure.

9 Fig. 4 shows an interactive entertainment system 60 according to a second  
10 implementation which accommodates third party independent service providers.  
11 Interactive entertainment system 60 includes headend 22 which supplies programs  
12 and supplemental content to a viewer computing unit 62. In this implementation,  
13 the viewer computing unit 62 is implemented as a computer 64 with a monitor 66,  
14 a central processing unit 68, a keyboard 70, and a mouse 72 (although other input  
15 devices can be used in addition to, or instead of, the keyboard and mouse).

16 The headend 22 serves the programs over a first network 74, which may be  
17 implemented like the fiber optic distribution structure described above, or as a  
18 satellite system or other wireless broadcast system, or as a conventional data  
19 network. It is noted that other program providers may be used instead of a  
20 headend, such as a broadcast station or an online service provider.

21 The interactive entertainment system 60 also includes multiple independent  
22 service providers (ISPs), as represented by ISP 80, which distribute digital content  
23 to the viewer computing unit 62 over a second network 82. An example of the  
24 second network 82 is a public network, such as the Internet. The ISP 80 has a host  
25 84 and a content database 86 to serve various multimedia content to the viewer's

1 computer. The ISP host 84 stores one or more target resources that can be  
2 rendered by the viewer computing unit 62.

3 The supplemental content provided by the ISP 80 is correlated with the  
4 programs by data structure 48 as described above. As shown in Fig. 3, the data  
5 field 58 includes target specifications to supplemental content provided by servers  
6 other than the program provider which distributes the show. In the illustrated  
7 example, the programs Seinfeld and Star Trek have associated ISP-served content  
8 which are located by the hyperlink URLs in corresponding data field 58. It is  
9 further noted that a program might have more than one source of supplemental  
10 content. The program record for "Star Trek" has two associated target  
11 specifications, one that references a target resource at the host computer  
12 "www.fox.com" and one that references a target resource at the host computer  
13 "www.collections.com."

14 According to this Fig. 4 arrangement, the viewer computing unit 62  
15 receives a non-interactive, continuous video stream from the headend 22, and  
16 supplemental interactive content from either the headend 22 or from an  
17 independent service provider 80. The supplemental content might therefore be  
18 carried to the viewer's computer over the same channel as the program, over a  
19 separate channel, or over a separate connection unrelated to the program channels.  
20 The back channel for facilitating interactive control is provided through either  
21 network 72 or 82.

22 In another implementation, the interactive content can be supplied locally  
23 by a storage medium, such as a CD-ROM. Suppose, for example, a content  
24 developer creates an interactive CD-ROM that can be played along with a  
25 particular movie. The supplemental content is accessed via disk reads to the local

1 storage drive, rather than using URLs to target resources over a network. The  
2 supplemental content is synchronized with the program using open loop control,  
3 such as a start time followed by measurable ticks or by frame count.

4 Fig. 5 shows a viewer computing unit, referenced generally as numeral 90,  
5 in more detail. The viewer computing unit 90 includes a processor 92, a volatile  
6 memory 94, and a program memory 96. The viewer computing unit 90 also has at  
7 least one receiver, and possibly two receivers, for receiving the video stream from  
8 the headend and the digital supplemental data from the headend or ISP. The first  
9 receiver is in the form of a tuner 98 which tunes to the channel or broadcast  
10 frequency to receive a video data stream from a program source, such as the  
11 headend, broadcaster, or other program provider. The second receiver, referenced  
12 generally as 100, can be implemented as a second tuner for receiving the content  
13 over a cable or wireless distribution network, or a modem for receiving the  
14 supplemental content over the Internet or other data network.

15 The viewer computer runs an operating system 101 which supports multiple  
16 applications. The operating system 101 is stored in memory and executes on the  
17 processor. The operating system is preferably a multitasking operating system  
18 which allows simultaneous execution of multiple applications. The operating  
19 system 101 employs a graphical user interface windowing environment which  
20 presents the applications or documents in specially delineated areas of the display  
21 screen called "windows." One preferred operating system is a Windows® brand  
22 operating system sold by Microsoft Corporation, such as Windows® 95 or  
23 Windows® NT or other derivative versions of Windows®. However, other  
24 operating systems which provide windowing environments may be employed, such  
25



1 as the Macintosh operating system from Apple Corporation and the OS/2 operating  
2 system from IBM.

3 A channel navigator application 102 is stored in program memory 96 and  
4 executes on the processor 92 to control the tuners 98 and 100 to select a desired  
5 channel for receiving the video content programs. An EPG application 104 is  
6 stored in program memory 96 and executes on the processor 92 to organize  
7 programming information downloaded from the EPG server at the headend. The  
8 EPG 104 supports a displayable user interface (UI) which visually correlates  
9 programs titles to scheduled viewing times and tuning information, such as a  
10 channel, in a scrollable grid format. The viewer computing unit 90 also has an  
11 interactive support module in the form of browser 106 which is kept in memory  
12 96. The browser 106 is dynamically loaded on processor 92 when needed to  
13 render content, such as a hypertext document, from an ISP or other content  
14 provider. The browser can be implemented as a hyperlink browser, or more  
15 particularly, as an Internet Web browser.

16 Although not shown, the viewer computer might also include on or more  
17 storage drives, such as a CD-ROM drive, to play interactive CD-ROMs in the  
18 event that supplemental data is supplied locally on disk.

19 Figs. 6 and 7 show a method for operating an interactive entertainment  
20 system to enhance a conventional continuous video data stream, such as a  
21 television show, with interactive supplemental content. This method is described  
22 with additional reference to the screen displays shown in Figs. 8a-8c.

23 The method begins when a viewer tunes to a particular channel (step 150 in  
24 Fig. 6). The channel navigator 102 controls the tuner 98 to tune to the channel.  
25 The viewer computing unit checks the appropriate channel and time slot of the

1 EPG data structure 48 to determine if the program being carried on the selected  
2 channel at this time is interactive (step 152). As described above, the presence of a  
3 target specification in the EPG data field 58 in association with the program is in  
4 indication that the program is interactive compatible and that there is supplemental  
5 content for the program. If the data field is empty, indicating that no supplemental  
6 content exists (i.e., the "no" branch from step 154), the viewer computing unit  
7 simply displays the video data stream being received through the tuner 98 (step  
8 156).

9 A run-time technique can alternatively be used for detecting whether a  
10 program is interactive compatible. Rather than checking the EPG data field, the  
11 viewer computing unit checks a dedicated channel for the existence of new  
12 supplemental content data. The dedicated channel is separate from the selected  
13 channel carrying the program so that the supplemental content is received by the  
14 viewer computing unit currently with the program video data. The existence of a  
15 supplemental content data stream over the dedicated channel indicates that the  
16 program being received on the selected channel is interactive compatible. This  
17 technique can be carried out without reference to the EPG listing.

18 If the program is interactive compatible (i.e., the "yes" branch from step  
19 154), the viewer computing unit retrieves the target specification from the EPG  
20 data structure (step 158 in Fig. 6). The target specification might be a pointer to a  
21 memory location at the headend, or a pointer to a memory location on a locally  
22 running CD-ROM, or a hyperlink to a target resource located at an independent  
23 service provider. The hyperlink browser 106 is loaded onto the processor to render  
24 the target resource referenced by the target specification (step 160).  
25

1 At this point, there are several ways to initiate viewing the supplemental  
2 content. One approach is to permit the viewer to selectively activate the  
3 interactive mode (i.e., the "viewer activate" branch from step 160). The viewer  
4 may know that the program is interactive compatible by checking a newspaper  
5 listing or other program guide. Another way is to have the viewer computing unit  
6 display an icon or other indicia on the screen to visually inform the viewer that the  
7 program is interactive compatible (step 162 in Fig. 6). The icon can be overlaid on  
8 the playing video program in a non-conspicuous manner, like the closed caption  
9 or stereo labels.

10 Fig. 8a shows an example screen 200 having a video program 202 playing  
11 at full-size on the screen. An icon 204 is displayed at the lower right corner of the  
12 screen to inform the viewer that the program 202 is interactive compatible. The  
13 icon 204 can be displayed throughout the program, or faded out after a set time  
14 period. This initial screen represents a first mode of interactivity, where the  
15 viewer is presented with the choice of interactive entertainment or non-interactive  
16 viewing of the program. As long as the viewer does not activate the icon 204, the  
17 viewer computing unit continues to receive the video content program over the  
18 selected channel and display that program alone, without any supplemental content  
19 (steps 166 and 168 in Fig. 6).

20 If the viewer decides to enter into an interactive mode, the viewer employs  
21 a remote control handset, mouse, keyboard, or other mechanism to actuate the icon  
22 204. This causes the browser 106 to start the target resource located by the target  
23 specification listed in the EPG data structure (step 170 via the "yes" branch from  
24 step 164).

1 This leads to another approach to invoking the supplemental content.  
2 Rather than displaying an icon and waiting for input from the viewer, the viewer  
3 computing unit can automatically activate the target resource as soon as the  
4 browser is loaded on the processor (step 170 from the "automatic" branch from  
5 step 160).

6 The target resource contains digital data which supports interactive  
7 functionality in conjunction with the associated video content program. The  
8 digital data defines the supplemental content to enable viewer interactivity with the  
9 video content program. The digital data also defines a display layout prescribing  
10 how the supplemental content and the video program are to appear in relation to  
11 one another when displayed on the screen.

12 The digital data further defines timing information to synchronize  
13 presentation of the supplemental content with the video content program. This  
14 timing information can be implemented in many different ways. One approach is  
15 to coordinate the supplemental content to a particular program start time, and then  
16 carefully measure time from that start time to synchronize presentation of the  
17 supplemental content with the appropriate points in the program. Another  
18 approach is to characterize the program in terms of frames, and key the  
19 introduction of supplemental content to the frame numbers.

20 The video stream and supplemental content can be transmitted together, as a  
21 single signal, or separately. In the former implementation, the digital data is  
22 packaged with the video stream and transmitted as one signal from the headend.  
23 The viewer computing unit receives the single signal at tuner 98 and separates the  
24 digital data from the video signal (steps 172 and 174). In the latter  
25 implementation, the video data stream is received over the selected channel via

1 tuner 98 from the program provider (step 172). The digital data is received from  
2 the target resource that is activated by the browser (step 174). This target resource  
3 might be located at the headend, in which case, the data is received over a separate  
4 channel using tuner 100; or the target resource might be served by an independent  
5 service provider, in which case, the data is received over a public network using  
6 the modem 100.

7 At the viewer computing unit, the digital data is deconstructed to extract the  
8 timing information and the display layout from the supplemental content (step 176  
9 in Fig. 6 and step 178 in Fig. 7). The display layout defines a program boundary  
10 within which the program is displayed to the viewer. The program boundary is  
11 sized and shaped according to parameters prescribed in the display layout. As the  
12 size and shape changes, the processor scales the video data for display within the  
13 program boundary at that instance (step 180 in Fig. 7).

14 The display layout also defines how the supplemental content is illustrated  
15 along with the program. The display layout prescribes the size, style, location, and  
16 other parameters for presenting the supplemental content. For instance, the  
17 supplemental content might be at least partly overlaid on the video program, or  
18 provided as a wrapper around, or along side, the program. The supplemental  
19 content is displayed according to this display layout and synchronized to the  
20 program according to the timing information (step 182 in Fig. 7). As an example,  
21 the supplemental content might be a trivia game which quizzes the viewer as to  
22 possible outcomes of various scenes. The questions are displayed on the screen  
23 according to the display layout and are timed using the timing information to  
24 coincide with the part of the program to which the questions pertain.  
25

1 Fig. 8b illustrates a screen 200 that is part of the interactive mode. Here,  
2 the video program is constrained within a program boundary 210 which is less  
3 than full-screen size. The program boundary 210 has been reduced in comparison  
4 to the full-size presentation of Fig. 8a to make room for the supplemental content.  
5 In this illustration, the supplemental content consists of a main menu having soft  
6 buttons 212-221, a highlighter or cursor icon 224, graphics bars 226, and a text  
7 block 228 to hold the program title. The soft buttons 212-221 present various  
8 control options to the viewer to invite interactive involvement with the program.

9 The illustrated screen is taken from an interactive program based on a Star  
10 Trek episode. To provide an example of the main menu, the soft buttons 212-216  
11 represent actions for calling up related TV shows and movies. For instance, button  
12 212 relates to the original Star Trek series; button 213 concerns The Next  
13 Generation series; button 214 represents the Deep Space Nine series; button 215  
14 represents the Voyager series; and button 216 relates to the various motion  
15 pictures.

16 Soft button 217 is an access/classified toggle which allows selection of one  
17 of two levels of interactivity. "Access" serves as a default mode of interactivity  
18 which contains the main menu functionality. The screen of Fig. 8b is an example  
19 of the access mode of interactivity. A voice-over narrative announces the mode  
20 when selected by button 217. Once in the access mode, the broadcast video stream  
21 is shrunk to fit within the smaller program boundary 210 to accommodate the main  
22 menu graphics. The alternate mode of interactivity, or "classified" mode, contains  
23 time-linked contextual information to provide a second tier of information. Fig.  
24 8c, shown below, is an example of the classified mode of interactivity.

1 Soft buttons 218-220 enable selection of different types of supplemental  
2 content. Button 218 relates to an encyclopedia containing numerous facts and  
3 information about the program. In the Star Trek program, for example, the  
4 encyclopedia might contain information on aliens, behind-the-scenes tidbits, cast  
5 and crew biographies, facts on other episodes, interviews with the actors/actresses,  
6 a technical manual explaining intricacies of starship operation and travel, and  
7 various timelines.

8 Button 219 is associated with a program guide, which provides a listing of  
9 current Star Trek shows for a two week period. The program guide also permits  
10 the user to change channels to another channel carrying a Star Trek show, if  
11 available.

12 Button 220 allows selection of entertainment content, which includes trivia  
13 games related to the program and a merchandise catalog. The trivia games  
14 segment allows viewers to compete against other regional competitors. The  
15 catalog lists available merchandise related to the program that can be purchased by  
16 the viewer.

17 The tenth button 221 is a quit button which allows the viewer to leave the  
18 interactive mode and return to a full-screen display, as shown in Fig. 8a.

19 The program and supplemental content are displayed as prescribed by the  
20 display layout. The digital data from the target resource, however, can  
21 dynamically change the display layout. When the display layout is changed (i.e.,  
22 the "yes" branch from step 184), the viewer computing unit re-sizes and/or  
23 reshapes the program boundary 210 and location of the supplemental content to  
24 achieve the presentation envisioned by the content developer (step 186). The  
25 display layout can be changed for various reasons. The display layout might

1 change in response to viewer selection of a soft button, as is the case causing the  
2 display layout change between Figs. 8b and 8c. The display layout might also be  
3 altered automatically as part of the timing information. For instance, the digital  
4 data might invoke a graphic or text to pop up on the screen at a timely point in the  
5 program. Such real-time content includes, for example, trivia questions,  
6 interesting facts, graphical or sound effects, and so forth that relate to specific parts  
7 of the program.

8 Fig. 8c shows the screen 200 at another instance after the viewer has  
9 selected soft button 220 to enter into a classified mode of interactivity. The main  
10 menu is still present on the screen, but more contextual information is added in a  
11 graphical format to represent an extension of the selected soft button 220. The  
12 program boundary 210 is further reduced to accommodate the additional graphical  
13 and textual information.

14 In this illustration, the viewer has selected the entertainment button 220 to  
15 display the merchandise store. This layout places the video program box 210 in  
16 the lower right hand corner of the screen, and leaves the remaining area of the  
17 screen to be used for supplemental content. The supplemental content comprises a  
18 secondary menu having actuatable soft buttons 232-237. The cursor symbol 224 is  
19 movable among the various buttons and used to activate a selected button. The  
20 buttons correspond to various types of merchandise, such as clothes, posters,  
21 collectibles, memorabilia, and toys. There is also an order button 237 that permits  
22 the user to place an order for a particular product. A picture window 240 is  
23 arranged beside the secondary menu to show a picture of the merchandise  
24 associated with the category indicated by the cursor symbol 224. A merchandise  
25



1 description window 242 contains a brief description of the merchandise shown in  
2 the picture window 240.

3 The system and method for presenting interactive entertainment programs is  
4 advantageous as it returns the freedom of creativity to the content developer. By  
5 embedding the display layout instructions within the digital data provided by a  
6 target resource, the developer is empowered to create both the content and the  
7 presentation format of how the content and broadcast program are displayed to the  
8 viewer. The developer is free to control the location and shape of the broadcast  
9 program window, as well as the presentation format of the supplemental content  
10 relative to the program window. This facilitates a non-restrictive environment in  
11 which the developer can create screens with optimal appeal to the viewer. No  
12 longer is the developer simply developing content to be displayed within a fixed  
13 pane that cannot be dynamically altered relative to the program.

14 The creative power is thus placed in the hands of the target resource author.  
15 Fig. 9 shows a method for authoring an interactive entertainment program. The  
16 author begins by developing the supplemental content which is to accompany a  
17 particular television show or movie (step 250 in Fig. 9). The author designs the  
18 presentation format for each scene of the program (step 252), and the timing  
19 requirements for synchronizing the supplemental content with the broadcast video  
20 stream (step 254).

21 In the implementation described herein, the supplemental content is  
22 constructed as a hypertext document which can be rendered by a browser. To  
23 control how the content is to be rendered, the author encodes the presentation  
24 format and timing instructions as extension attributes to hyperlink codes. More  
25 specifically, hypermedia content utilized by the WWW is commonly written using

1 what is referred to as a "markup language." "SGML" (Standard Generalized  
2 Markup Language) is one such language, defined formally as "a language for  
3 document representation that formalizes markup and frees it of system and  
4 processing dependencies." SGML is a language for describing the structure of  
5 documents and for describing a tagging scheme to delineate that structure within  
6 text. For creating hypermedia content, WWW documents utilize a subset of  
7 SGML called "HTML" (Hypertext Markup Language). An HTML textual  
8 document can be thought of as plain text that contains formatting instructions in  
9 the form of HTML markup codes or "tags." Tags tell Web browsers how to render  
10 and print documents, and are also used to specify hyperlinks.

11 The following is a simple example of a start tag for an HTML hyperlink:

12  
13 <A HREF="http://www.microsoft.com/upgrades">  
14

15 The leading "A" in the start tag is the name of HTML element. The letter  
16 "A" indicates that the tag is an "anchor" tag—the type of tag that defines a  
17 hyperlink. The start tag contains an "attribute" indicating a target specification:  
18

19 HREF="http://www.microsoft.com/upgrades".  
20

21 The attribute name is "HREF" and the attribute value is  
22 "http://www.microsoft.com/upgrades." HTML documents are organized  
23 according to various tags. Tags define the start and end of headings, paragraphs,  
24 lists, character highlighting and links, and so on.  
25

1 The interactive entertainment system described herein supports  
2 conventional HTML documents as target resources. Accordingly, authors can use  
3 familiar HTML elements, such as Head, Body, and Character-Level elements, to  
4 construct a target resource. However, the inventors have also developed new types  
5 of tags, as well as extension attributes to existing HTML tags. The author of a  
6 target resource can use the new tags and extension attributes to formulate how and  
7 when the browser renders the supplemental content along with the continuous  
8 video stream. The new HTML extension attributes are given below in Table 1.

9  
10 **Table 1: HTML Extension Attributes**

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HTML Tag	Extension Attribute	Function
BODY	background	Specifies a URL for an image tile or MMS stream to cover the document background to yield a distinctive appearance.
IMG	dynsrc	Specifies the address of a video clip or broadcast source to be displayed.
FRAMESET	usedefault	Used to determine where the focus is located in a tab-based user interface within a FRAME by specifying the URL for the file containing the map, followed by a '#', followed by the name of the USEDEFAULT. If the argument to USEDEFAULT starts with a '#', the map is assumed to be in the same document as the USEDEFAULT tag

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The new tags supported by the interactive entertainment system are provided in Table 2.

Table 2: HTML Tags

HTML Tag	Function	Permitted Attributes
ACTION	Controls update or display of sound or picture	<u>CELL</u> —identifies object in a GALLERY <u>HREF</u> —URL to resource or object <u>ID</u> —label or id for this element <u>TARGET</u> —where to perform action such as a FRAME or RENDERIMAGE element
EVENT	Associates trigger and action	<u>TRIGGER</u> --reference to TRIGGER element to be used with this event <u>ACTION</u> --reference to TRIGGER element to be used with this event - allow comment delimited list of actions to satisfy the need for multiple actions in response to a single trigger <u>ID</u> —name of event
GALLERY	Stores and coordinates collection of images	<u>SOURCE</u> —URL to actual graphic <u>ID</u> —name of gallery <u>ROWS</u> —height of each graphic cell <u>COLUMNS</u> —width of each graphic

		cell <u>TRANSPARENCY</u> —RGB value indicating background color
LOADFONT	Downloads and installs a font to be used	<u>HREF</u> - URL to font resource
RENDERIMAGE	Displays an image from the GALLERY	<u>REF</u> —name of GALLERY <u>CELL</u> —specifies individual cells containing image
TRANSITION	Defines screen change interim, fade to black, cut, and so on.	<u>TYPE</u> —type of transition <u>SPEED</u> —how fast does the transition occur, SLOWEST, SLOW, MEDIUM, FAST, FASTEST
TRIGGER	Defines when something is to occur	<u>ID</u> —name of this TRIGGER <u>TIME</u> —time in milliseconds since the last event

Using the supplemental content and HTML tags for timing and presentation format, the author constructs the target resource (step 256 in Fig. 9). The target resource is stored in a storage medium at a host computer and a target specification for referencing that location is defined (step 258). The author submits the target specification to the authority responsible for developing the programming information maintained in the EPG database. The target specification is stored in

1 the appropriate data field of the EPG data structure which corresponds to the  
2 program to which it pertains (step 260).

3 In compliance with the statute, the invention has been described in language  
4 more or less specific as to structure and method features. It is to be understood,  
5 however, that the invention is not limited to the specific features described, since  
6 the means herein disclosed comprise exemplary forms of putting the invention into  
7 effect. The invention is, therefore, claimed in any of its forms or modifications  
8 within the proper scope of the appended claims appropriately interpreted in  
9 accordance with the doctrine of equivalents and other applicable judicial doctrines.  
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